(12) UK Patent Application (19) GB (11) 2 285 946 (13) A

(43) Date f A Publication 02.08.1995

(21) Application No 9400039.5

(22) Date of Filing 04.01.1994

(51) INT CL[6]
B29C 47/06 // B29K 23:00 , B29L 31:26 31:30

(52) UK CL (Edition N)
B5A AC AT17D A1G10 A1R214B A1R214H A1R314C1C A1R408 A1R422 A20T17

(56) Documents Cited
GB 1428811 A EP 0294214 A2 EP 0012941 A1

(58) Field of Search
UK CL (Edition M) B5A AC AT17D
INT CL[5] B29C 47/00 47/06
Online databases:WPI

(71) Applicant(s)
Tokiwa Chemical Industries Co Ltd
(Incorporated in Japan)
261-5 Kawarako, Shiroi-cho, Inba-gun, Chiba, Japan
System Technical Co Ltd
(Incorporated in Japan)
22-5 Matsugaoka 2-chome, Moriya-machi, Kitasouma-gun, Ibaragi, Japan

(72) Inventor(s)
Naohisa Miyakawa
Katsuhisa Kato

(74) Agent and/or Address for Service
Gee and Co
Chancery House, Chancery Lane, LONDON, WC2A 1QU, United Kingdom

(54) Method for manufacturing weather strip for motor vehicles

(57) A weather strip 1 for motor vehicles, is provided with a protective film 5 having a low friction and an increased tightness on an abutment portion 4 of the weather strip body with which the glass pane 6 of a vehicle door is to be brought into contact. An olefin polymer, which may be foamed, is extruded from one extrusion moulding machine (21: Figs. 6 and 7 not shown) into a mould (23: Figs. 6 and 7 not shown) for forming the weather strip body, while a mixture consisting of a base material of an olefin polymer with low viscosity and high fluidity and an additive material of an olefin polymer with a high viscosity and a low fluidity in the form of the grains or particles is extruded from another moulding machine (22: Figs. 6 and 7 not shown) into the mould (23) to form the protective film. A rough surface having a plurality of protrusions is formed on the surface of the protective film by the grains or particles of the additive material.

FIG. 2.

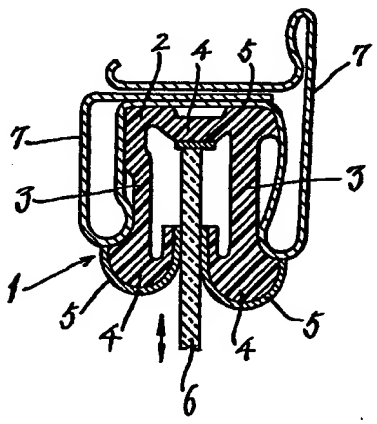
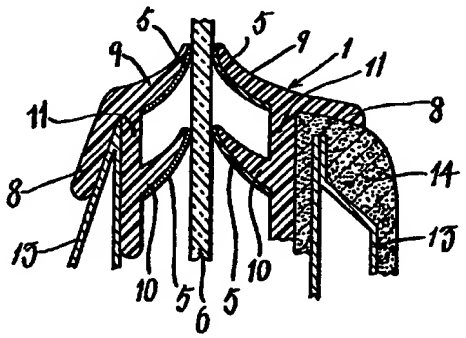


FIG. 3.



GB 2 285 946 A

FIG. 1.

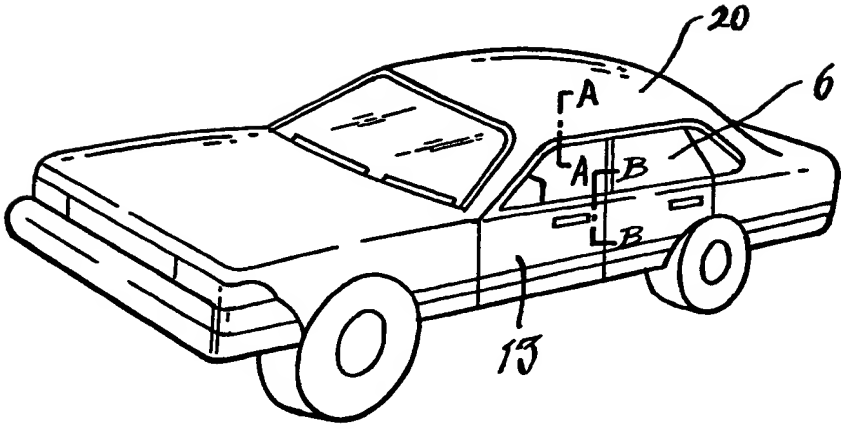


FIG. 2.

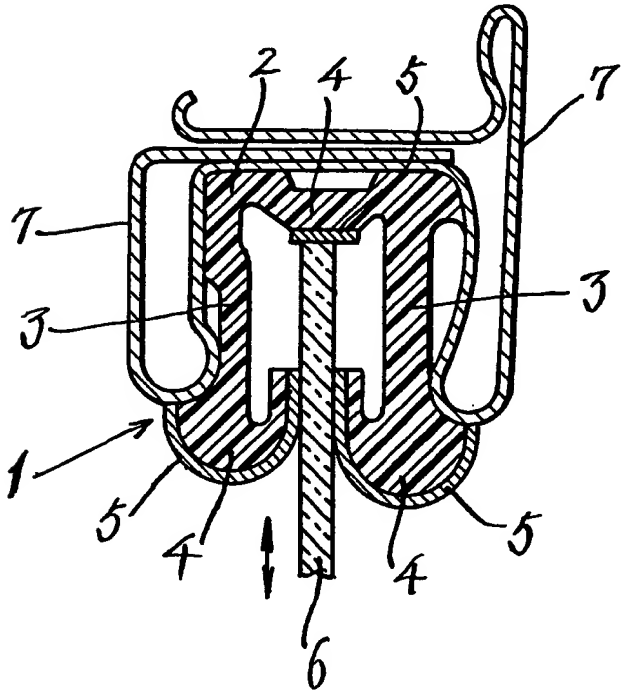


FIG. 3.

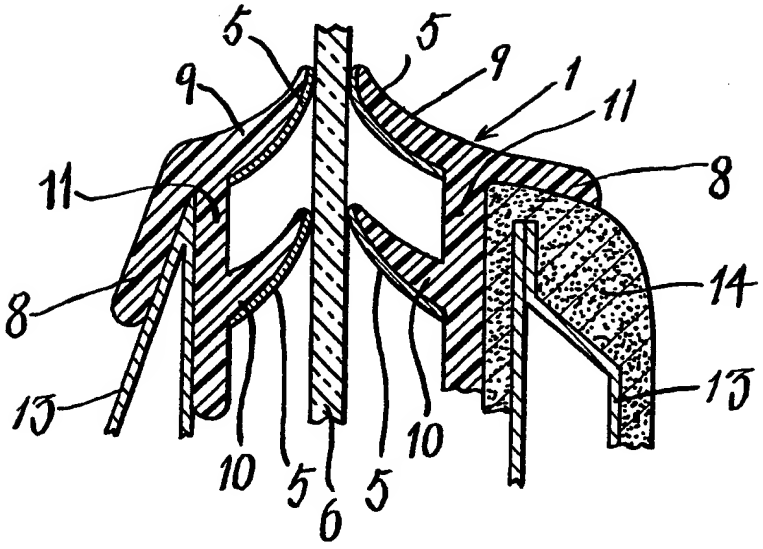


FIG. 4.

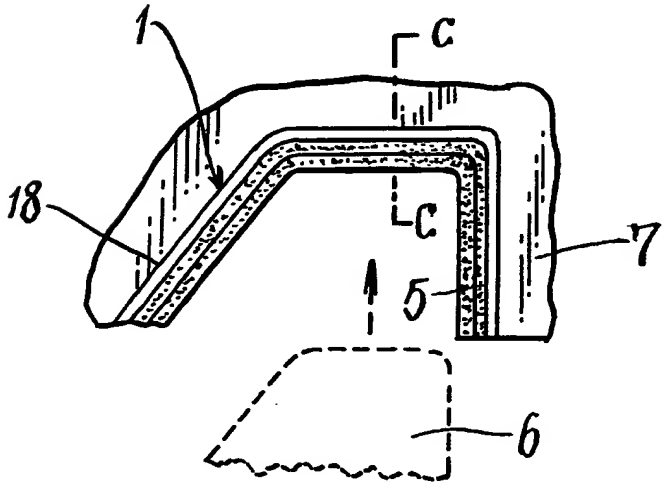


FIG.5.

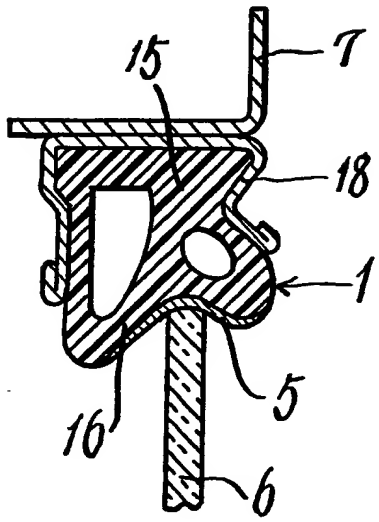


FIG.6.

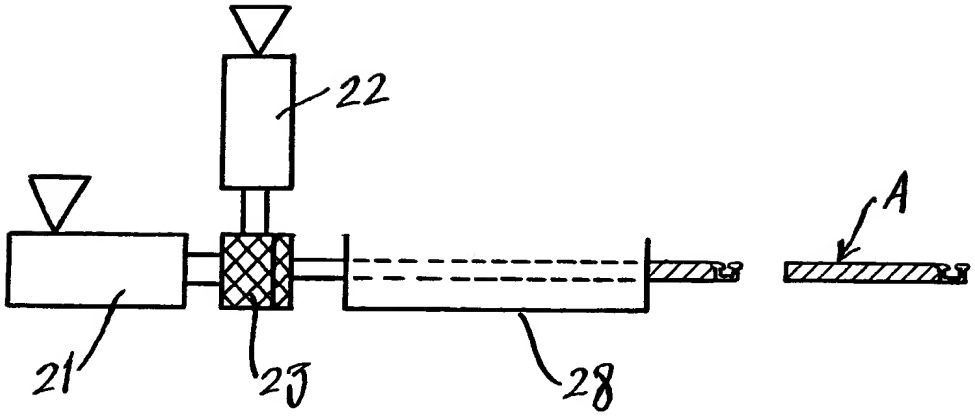


FIG. 7.

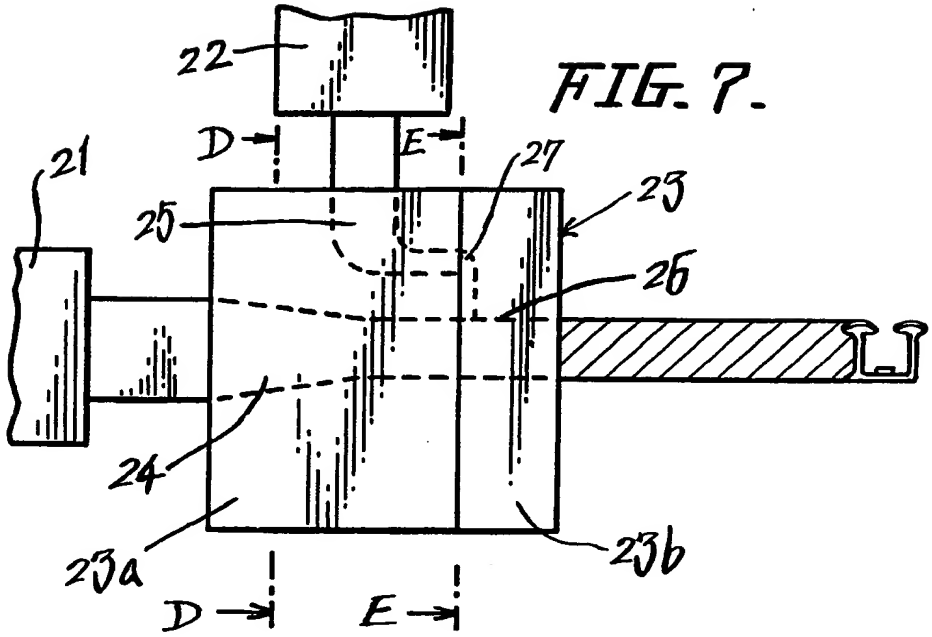


FIG. 8.

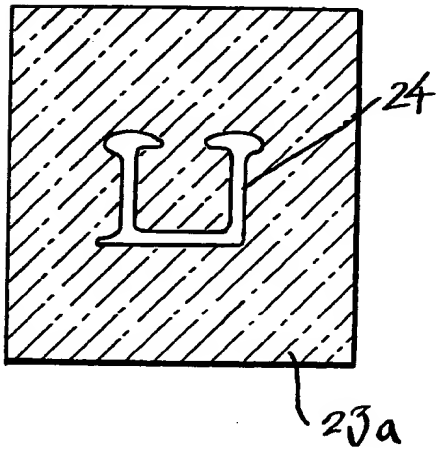
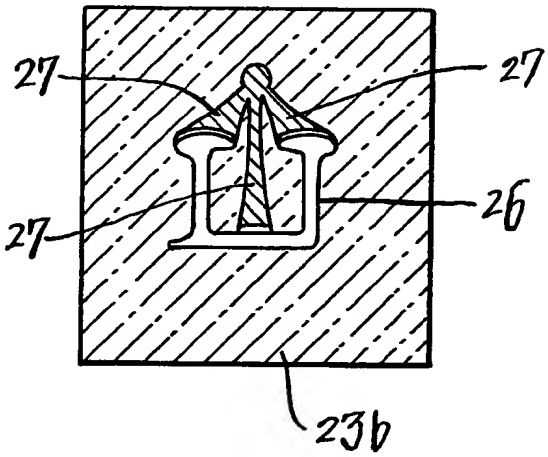


FIG. 9.



METHOD FOR MANUFACTURING WEATHER STRIP FOR MOTOR VEHICLES

The present invention relates to a method for manufacturing a weather strip which is attached to a vehicle body panel or a door panel and with which a glass pane of the vehicle is to be brought into contact, and more particularly to a method for manufacturing a weather strip wherein a protective film having a low friction and an increased weather tightness is integrally extruded on the weather strip body.

Conventionally, a weather strip for motor vehicles is formed with an abutment portion for contact with a glass pane, this abutment portion being of synthetic rubber or a thermoplastic elastomer having flexibility, resiliency and a low friction so as to retain water-tightness, and to enable smooth opening and closing movement of the glass pane. However, such synthetic rubber or thermoplastic elastomer forming the abutment portion has the disadvantage that it may be liable to damage by a rubbing action, and that its skin may easily be roughened and torn off upon contact with a solvent such as a white gasoline.

A method of manufacturing weather strip is also known, wherein a urethane resin or a nylon is melted onto the abutment portion of the weather strip in order to prevent weakening of the synthetic rubber or thermoplastic elastomer forming the abutment portion of the weather strip. However, this method has the drawback that the frictional resistance of the surface of the weather strip is increased and may prevent smooth opening and closing movement of the glass pane. The manufacturing process is also expensive and cumbersome, since the steps of heating and melting the urethane resin and nylon must be carried out separately from the step of moulding the weather strip body.

Furthermore, in another weather strip manufacturing method a synthetic resin tape containing molybdenum is adhesively bonded with the abutment portion of the weather strip in order

t improve the sliding characteristics of the latter. However, in this weather strip manufacturing method, the step of adhesively bonding the tape over the abutment portion is not only very difficult and cumbersome to carry out, but it also has the disadvantage that the synthetic tape may not be adhesively bonded with sufficient strength over non-flat portions such as curved and corner areas of the weather strip.

It is an object of the present invention to provide a method for manufacturing a weather strip for motor vehicles, wherein a protective film is extruded simultaneously with, and polymerized integrally with, the weather strip body, whereby a protective film having a toughness, a low friction and an increased weather tightness can be formed on the abutment portion with which a glass pane is to be brought into contact.

The invention accordingly provides a method for manufacturing a weather strip for motor vehicles including the steps of:

extruding a molten material comprising an olefin polymer to form a weather strip body having an abutment portion with which a glass pane is to be brought into contact, and

extruding a molten mixture including a base material comprising an olefin polymer having a low viscosity and high fluidity and an additive material comprising an olefin polymer in the form of grains or particles and having a viscosity higher than that of said base material and a fluidity lower than that of said base material, to form a protective film over the abutment portion of the weather strip body,

the said molten material and the said molten mixture being fed simultaneously to a common mould from respective moulding machines in such a manner that the said protective film is formed with a rough surface having a plurality of protrusions comprising the grains or particles of the said additive material.

The said molten material may be a foamed material.

In co-extruding the weath r strip body and th protectiv film, a strong and integral polymerization takes place between the olefin polymer of the weather strip body and the low viscosity olefin polymer of the protective film base material, since they have compatibility. Furthermore, since the grains or particles of the olefin polymer of the additive material for the protective film have a high viscosity and reduced fluidity, they form a rough surface with a plurality of protrusions.

The invention is illustrated by way of example in the accompanying drawings, in which;

Figure 1 is a perspective view showing a weather strip produced by the method of the present invention in respective portions of a motor vehicle;

Figure 2 is a vertical cross sectional view taken along line A - A in Fig. 1;

Figure 3 is a vertical cross sectional view taken along line B - B in Fig. 1;

Figure 4 is a partially cut-away elevation showing a weather strip which is produced in accordance with the present invention and which is mounted on a motor vehicle body panel;

Figure 5 is a vertical cross sectional view taken along line C - C in Fig. 4;

Figure 6 is a schematic view showing a process for manufacturing a weather strip for motor vehicles in accordance with the present invention;

Figure 7 is an enlarged elevation of moulding machines and a mould for use in the method of the invention;

Figur 8 is a v rtical cross s ctional view of the mould taken along line D - D in Fig. 7; and

Figure 9 is a vertical cross sectional view taken along line E - E in Fig. 7.

One embodiment of the method for manufacturing a weather strip in accordance with the present invention will be described hereinbelow, with reference to the accompanying drawings.

A weather strip body 1 is formed from an olefin polymer based resin which may be a foamed material and is attached to a vehicle body panel 7 and a door panel 13 for contact with a door glass panel 6 mounted to a vehicle body 20 of a motor vehicle. The weather strip body 1 in the embodiment as shown in Fig. 2 comprises an attachment portion 2 formed at its base and vertical support strips 3 which depend from opposite sides thereof. The attachment portion 2 is provided at the central portion with an abutment portion 4, with which the glass pane 6 is to make contact and each vertical support strip 3 is provided at the tip with an abutment portion 4, with which the glass pane 6 is to make contact. These abutment portions 4 of the weather strip body 1 are integrally formed with a protective film 5 at the time when the weather strip body 1 is extrusion-moulded, whereby the protective film 5 may be polymerized. The protective film 5 is formed by a mixture consisting of a base material of olefin polymer based resin with low viscosity and high fluidity and an additive material of olefin polymer based resin with high viscosity and low fluidity in the form of grains or particles.

In the manufacturing steps as shown in Fig. 6 to Fig. 9, an olefin polymer based resin is fed to one moulding machine 21 to form the weather strip 1 and is m lted by heating.

The mixture of the base material comprising the olefin polymer

based resin with low viscosity and high fluidity and the additive material comprising the olefin polymer based resin with high viscosity and low fluidity in the form of grains or particles is fed to another moulding machine 22 and is melted by heating.

The moulding machines 21 and 22 are connected with one mould 23, and the olefin polymer based resin to form the weather strip body 1 and the mixture of the base material and additive material to form the protective film 5 are extruded into the mould 23.

The mould 23 comprises two mould sections 23a and 23b. The mould section 23a is provided with a guide slot 24 in a shape that conforms to that of the weather strip body 1 and with a flowing slot 25 for the protective film 5. The mould section 23b is provided with an extrusion port 26 having the configuration of the weather strip body 1 and the protective film 5. The guide slot 24 for the weather strip 1 is connected with the extrusion port 26, and the flowing slot 25 for the protective film is in communication with the extrusion port 26 through a guide groove 27 formed in the mould section 23b.

The olefin polymer based resin of the weather strip body 1 is extruded from the moulding machine 21 to the mould 23 through the guide slot 24, and the mixture of the protective film 5 is extruded from the extrusion moulding machine 22 to the mould 23 through the guide groove 27. The weather strip body 1 and the protective film 5 are polymerized and extruded through the extrusion port 26 of the mould 23. The protective film 5 is formed upon the weather strip body 1 as the weather strip body 1 is extruded.

During th proc ss of co-extruding the weather strip body 1 and the protective film 5, the olefin polymer based resin of

th additiv mat rial for th prot ctive film 5 is not completely melted like the polyolefin-based resin of the base material while in a melting configuration, since it has a high viscosity and a low fluidity, and is extruded in a configuration wherein grains or particles are retained to a certain extent. Thus, a rough surface having a plurality of protrusions is formed on the surface of the protective film 5. Subsequently, the extruded product with the rough surface is cooled by passing it through a cooling tank 28, and is cut into a proper dimension as needed to form the final finished product A.

The base material for the protective film 5 preferably uses a low viscosity polyethylene having a melt flow rate of over 0.5g/10 minutes, and the additive material in the form of the grains and particles preferably uses a high viscosity polyethylene having a flow melt rate of less than 0.1g/10 minutes.

In the preferred embodiment of the method for manufacturing the weather strip in accordance with the present invention, the mixture for the protective film contains the additive material in a proportion of 10 - 30%. and the grain or particle size of the additive material is selected to be in the range of 0.005mm - 0.15mm. The olefin polymer based resin or the foamed material to form the weather strip body which is fed to the extrusion moulding machine 21 is heated to a temperature of 190°C, whereas the mixture of the protective film which is fed to the co-extrusion moulding machine 22 is heated to the temperature of 220°C. A satisfactorily rough surface may be formed onto the surface of the protective film at the time when the protective film is polymerized in a thickness of 0.04mm upon the weather strip body in the mould 23 which is heated up to 190°C.

The weath r strip body 1 of the embodiment shown in Fig. 3 is

int rposed betw n a draining frame of the door pan l 13 and a leather portion 14. The weather strip body 1 comprises a vertical support strip 11 which stands upright against the glass pane 6, and amounting portion 8 which protrudes outwardly from the support strip 11. The vertical support strip 11 is provided with an upper abutment portion 9 and a lower abutment portion 10 each of which protrudes into contact with the glass pane 6. The upper abutment portion 9 and the lower abutment portion 10 of the weather strip body 1 are integrally provided with the protective film 5. Said protective film 5 is extruded by using the component material, two extrusion moulding machines 21 and 22, and a mould 23, as described above in connection with the manufacturing process, when the weather strip body 1 is extruded, and is polymerized unitedly with the weather strip body 1.

The weather strip body 1 in the embodiment shown in Fig. 4 and Fig. 5 is secured in position upon a support sash 18 which is provided on the body panel 7 against which the upper edge of the door glass pane 6 may abut. The weather strip body 1 is provided with a mounting portion 15 for attachment to the support sash 18 at the upper portion, and at the lower portion with an abutment portion 16 against which the glass pane 6 may abut. The abutment portion 16 of the weather strip body 1 is provided with the protective film 5 which is co-extruded by using the component material, two extrusion moulding machines 21 and 22, and a mould 23, as described above in connection with the manufacturing process at the time when the weather strip body 1 is extruded and is polymerized unitedly with the weather strip body 1.

Since the protective film in the method of manufacturing the weather strip for motor vehicles in accordance with the present invention is unitedly and fixedly polymerized on the abutment portion with which the glass pane is brought into contact, the protective film can be used for longer periods

without being abnormally abraded or peeled off from the weather strip body. Moreover, since the protective film is integrally polymerized on the abutment portion simultaneously with the extrusion moulding of the weather strip body, the manufacturing process is facilitated. Furthermore, since a rough surface with a plurality of protrusions is formed on the surface of the protective film, the opening and closing operation of the glass pane can be conducted smoothly and water tightness for the glass pane is improved.

CLAIMS

1. A method for manufacturing a weather strip for motor vehicles including the steps of:

extruding a molten material comprising an olefin polymer to form a weather strip body having an abutment portion with which a glass pane is to be brought into contact, and

extruding a molten mixture including a base material comprising an olefin polymer having a low viscosity and high fluidity and an additive material comprising an olefin polymer in the form of grains or particles and having a viscosity higher than that of said base material and a fluidity lower than that of said base material, to form a protective film over the abutment portion of the weather strip body,

the said molten material and the said molten mixture being fed simultaneously to a common mould from respective moulding machines in such a manner that the said protective film is formed with a rough surface having a plurality of protrusions comprising the grains or particles of the said additive material.

2. A method as claimed in Claim 1 wherein said molten material is a foamed material.

3. A method as claimed in Claim 1 or 2, wherein the base material for the mixture comprises a low viscosity polyethylene having a melt flow rate of about 0.5g/10 minutes (ASTM D1238 190°C) and the additive material comprises a high viscosity polyethylene having a melt flow rate of less than 0.1g/10 minutes (ASTM D1238 190°C)

4. A method as claimed in any one of Claims 1 - 3, wherein said mixture contains 70-90% base material and 10-30% additive material and the grain or particle size of the additive material is 0.005mm to 0.15mm.

5. A m thod as claimed in any one of Claims 1 - 4, wh r in the molten material to from the weather strip body is heated to a temperature of 190°C in said one extrusion moulding machine, while the mixture to form the protective film is heated to a temperature of 220°C in said other extrusion moulding machine, and the protective film is polymerized with the weather strip body in a thickness of 0.04mm in the mould which is heated to a temperature of 190°C.

6. A method for the manufacture of a weather strip, substantially as described herein with reference to the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 -11- (The Search report)	Application number GB 9400039.5
Relevant Technical Fields (i) UK Cl (Ed.M) B5A (AT17D; AC) (ii) Int Cl (Ed.5) B29C (47/00; 47/06)	Search Examiner J P LEIGHTON Date of completion of Search 24 FEBRUARY 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASES: WPI	Documents considered relevant following a search in respect of Claims :- 1-6

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document

Category	Identity of document and relevant passages		Relevant to claim(s)
A	GB 1428811	(CUSTOM TRIM PRODUCTS)	
A	EP 0294214 A2	(P C E CORPORATION)	
A	EP 0012941 A1	(SCHLEGEL GMBH)	

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).